

WASHINGTON

SCIENCE TRENDS

HIGHLIGHTS

- INSTITUTIONAL GRANTS
- TECHNICAL TRENDS
- GRADUATE RESEARCH FACILITIES
- NAVY SHIPBUILDING REPORT
- RESEARCH CHECKLIST
- PUBLICATION CHECKLIST

Vol. IV, No. 19

July 25, 1960

* INSTITUTIONAL GRANTS

Grants up to \$50,000 per year will be made to colleges and universities in a new and experimental program of "Institutional Grants" established by the National Science Foundation. The program marks a sharp departure from previous policies, under which grants have been made only for specific projects, or for laboratories (reported elsewhere in this issue).

A new Office of Institutional Programs, to be headed by Louis Levin of the Foundation staff has been established to handle the new programs. Amounts of grants will be limited to five percent of Foundation research grant payments made to the institution during the previous year. During the first year of operation institutional grants will be based on the nine-month period from July 1, 1960 to March 31, 1961. Succeeding programs will be based on a full year, April 1 through March 31.

* ARMY COMMUNICATIONS

∅ Transportable Single Sideband equipment is being purchased by the Army for location at strategic points throughout the world. The equipment will be for emergency use by joint task forces to insure the functioning of strategic communications to the United States and the appropriate unified commander.

∅ New On-line Cryptographic Equipment is being procured under objectives established by the National Security Council. The improved devices, being installed at various classified locations, are designed to speed the handling of classified traffic from various points throughout the world.

∅ Specialized Antijamming Equipment is designed to insure communications capability in the event of severe enemy jamming. One component is Lincoln F9C equipment which will be placed in certain strategic Army communications stations, selected on the basis of an analysis of enemy antijamming capabilities. (During recent Soviet threats in the Berlin Area such equipment was rushed from the Pacific to the European theater. A priority task is the replacement of the relocated facility.)

* NEW GRAPHITE PROCESS

Substantial reductions in the time and cost of making molded graphite are expected from a new process developed under Atomic Energy Commission contract by the Armour Research Foundation. Such graphite is important as a moderator in various types of nuclear reactors, as well as other applications.

The new process combines previously required steps into a single heating and cooling cycle. Key to this is the use of a synthetic binder, furfuryl alcohol which is combined with petroleum coke and heated directly. Specimens which took two weeks to prepare are now available in two hours.

TECHNICAL TRENDS

The Navy expects to buy 500 to 2000 15 megacycle oscilloscopes during the new fiscal year and manufacturers are being urged to take prompt action to have their products of this type qualified. For further information, write Chief, Bureau of Ships, Department of the Navy, Washington 25, D. C. regarding Spec. Mil -O-22237 (SHIPS)... Chance Vought Aeronautics Division will study development of glare-free luminous cockpit panels under a new \$100,000 Navy contract. The system is expected to eliminate problems of uneven light distribution and high failure rates found in present incandescent systems. One problem will be development of a system which produces a white or red light -- preferably red to preserve a pilot's night vision.

Bausch and Lomb Optical Company will conduct a \$47,405 feasibility study for the development of a solid-state optical viewing device. It is intended to suppress flash blindness and thermal eye burn during nuclear weapon bursts... Dr. John McCallum of Battelle Memorial Institute, Columbus, Ohio sees an experimental electrolytic gas cell generating an oxygen-hydrogen mixture as a promising fuel source for explosive metal forming and high-temperature welding and cutting torches. Potential applications include forming large sheet parts, of the type used in the aircraft and missile industry.

Army Signal Corps hopes to receive next year the first of 12 radio Communication central systems under a \$10.9 million contract with Motorola Military Electronics, Phoenix, Ariz. Single sideband is used to provide more channels of information and more communications systems in a single zone. The central can transmit and receive voice, facsimile and teletype messages and features full duplex operation, in-channel net and emergency conventional netting... Hydrogen ions or protons are suggested as the "true culprits" in iron corrosion by researchers E. A. Gulbransen and T. P. Copan of Westinghouse Research Laboratories. Their new theory suggests that the hydrogen ions from water vapor penetrate iron and enlarge the sites at which oxygen normally combines with metal -- spreading the reaction throughout the surface and causing it to rust destructively...

The first nuclear power credit granted by the Export-Import Bank of Washington will assist in financing a reactor-type electric powerplant to be built in Northern Italy. The \$34 million credit will finance purchases of U. S. equipment, materials and engineering services. Repayment is scheduled over a 15½ year period beginning in 1964... Federal Aviation Agency has ruled that all turbine powered air carrier aircraft, including turbo-props must be equipped with devices that automatically record on a magnetic or aluminum tape the plane's airspeed, altitude, vertical acceleration, heading and time to assist in determining the cause of in-flight aircraft incidents and accidents...

Design and fabrication of a sustaining ramjet propulsion system for a new supersonic Army target missile system will be carried out under a North American Aviation subcontract to the Marquardt Corp., Van Nuys, Calif. The missile is designed to operate at speed ranges from subsonic up to Mach 2 from ground level to over 50,000 feet. On a high-level mission a small triangular wing is attached. On a low-level mission the wing will be removed... General Precision Laboratories, Inc. will study feasibility of a radar semi-active antitank system under a \$71,000 Ordnance contract... The Martin Co. Nuclear Div. expects to provide the Atomic Energy Commission early next year with an automatic electronic "sentry" incorporating a 5-watt generator which will convert heat from pellets containing Strontium-90 directly into a continuous flow of electricity. It is expected that the unit will be capable of recording data and transmitting it from a remote ground station for at least two years without refueling or servicing.

* GRADUATE RESEARCH FACILITIES

The National Science Foundation is awarding \$2,153,710 to 54 colleges and universities for the improvement of graduate research laboratories. A much larger program had been anticipated by the Foundation for 1961, but funds have been cut by Congress. Each institution must provide matching funds to qualify for these grants.

In addition to substantially aiding the nation's basic research effort, these programs are expected to be of interest to laboratory and other equipment manufacturers.

Grants go to: University of Arizona, Tucson, \$7,000; California Institute of Technology, Pasadena, \$44,600; University of California, Berkeley, \$150,000; University of Southern California, Los Angeles, \$48,700; Stanford University, Stanford, \$13,500; Georgetown U., Washington, D. C., \$15,750; Howard University, Washington, D. C., \$13,800; Florida State University, Tallahassee, \$3,000; Emory U., Emory, Ga., \$21,000.

University of Chicago, \$60,000; University of Illinois, Urbana, \$112,400; Indiana University, Bloomington, \$106,700; University of Notre Dame, \$26,500; Purdue University, Lafayette, \$85,300; Iowa State U., Iowa City, \$40,000; Kansas State U., Manhattan, \$10,500; Kentucky Research Foundation, Lexington, \$3,200; Louisiana State U., Baton Rouge, \$22,500; Tulane University, New Orleans, \$9,900; University of Md., College Park, \$8,000; Tufts College, Medford, Mass., \$12,500.

University of Michigan, Ann Arbor, \$112,085; Wayne State U., Detroit, \$50,000; University of Minnesota, Minneapolis, \$105,700; University of Missouri, Columbia, \$20,000; Washington U., St. Louis, \$1,950; University of Nebraska, Lincoln, \$6,500; Rutgers U., New Brunswick, \$109,400; Stevens Institute of Technology, Hoboken, \$7,500; New Mexico A&M College, State College, N. Mex., \$12,500; University of New Mexico, Albuquerque, \$12,600.

Cornell U., Ithaca, N. Y., \$15,900; R.P.I., Troy, N. Y., \$37,500; University of Rochester, \$59,300; Rockefeller Institute, N.Y.C., \$32,250; Syracuse U. Research Institute, \$24,800; University of Akron, \$14,400; Ohio State U., Columbus, \$55,000; Western Reserve U., Cleveland, \$14,350; Oklahoma State U., Stillwater, \$3,300; University of Oklahoma, Norman, \$6,700.

University of Oregon, Eugene, \$70,175; Carnegie Institute of Technology, Pittsburgh, \$30,000; Pennsylvania State U., University Park, \$24,000; University of Pennsylvania, Philadelphia, \$28,500; University of Pittsburgh, Pittsburgh, \$24,000; State University of South Dakota, Vermillion, \$5,000; Vanderbilt U., Nashville, Tenn., \$136,300; A&M College of Texas, College Station, \$16,300; Rice Institute, Houston, \$32,100; Virginia Polytechnic Institute, Blacksburg, \$52,700; University of Washington, Seattle, \$1,700; Washington State U., Pullman, \$15,800 and University of Wisconsin, Madison, \$200,500.

This program was designated by the Foundation as an experimental system of "pilot" grants. Nevertheless, as of the Spring of 1960, colleges and universities submitted proposals totaling over \$20.5 million.

* NAVY SHIPBUILDING PROGRAM

Here is a summary-outline of the U. S. Navy's surface shipbuilding program for the current fiscal year, exclusive of the conventional or nuclear aircraft carrier which has been a subject of controversy:

Ø Guided Missile Frigates -- Three to built for \$227.8 million.

Guided missile frigates will operate offensively against enemy air, surface and subsurface forces, either independently or as units of attack carrier strike forces, amphibious forces or antisubmarine forces. Armament will include two twin-Terrier medium range surface-to-air missile batteries; two twin 3"/50 caliber gun systems; long range sonar; an antisubmarine rocket launcher and two antisubmarine torpedo launchers. Previously funded and now under construction are 19 conventionally powered frigates and one nuclear-powered frigate.

Ø Guided Missile Destroyers -- Two to be built for \$88.8 million.

This class has been designed to screen naval forces and shipping against airborne, surface and subsurface attack and to provide gunfire support for amphibious assault and land forces. Armament will consist of one Tartar short-range missile battery; two 5"/54 caliber rapid-fire guns; a long-range sonar; an antisubmarine rocket launcher and two antisubmarine torpedo launchers. Previously funded and under construction are 21 other guided missile destroyers.

Ø Escort Vessels -- Two to be built for \$50.5 million.

These ships are especially designed for optimum performance in locating and destroying enemy submarines. They can operate as part of a hunter-killer group; screen amphibious forces, patrol coastal waters for missile-firing submarines or escort convoys. One and possibly both will be fitted with a newly developed pressure-fired boiler. Each will carry integral bow-mounted long-range sonar and the drone antisubmarine (DASH) helicopters which will carry ASW torpedoes for long-range attacks. An antisubmarine rocket launcher and antisubmarine torpedo launchers are provided for destruction of submarines at medium range. Armament will also include one twin 3"/50 caliber rapid fire mount installed forward and one single 3"/50 caliber rapid-fire mount aft for limited self-defense.

Ø Fast Combat Support Ship -- One to be built for \$64 million.

This new type of ship will operate as an integral part of a fast task force and is designed to provide continuous replenishment of black oil, aviation fuel, diesel oil, conventional ammunition, fleet missiles up to and including the Talos, selected underwater ordnance, special weapons and provisions. Capacity will be 177,000 barrels. Three cargo helicopters will operate from the deck and the vessel can service ships along both sides simultaneously. Armament will consist of four 3"/50 caliber rapid-fire twin mounts.

Ø Combat Stores Ship -- One to be built at \$44.1 million.

This new type of ship will replace the present stores ship, general stores issue ship and aviation supply ship types in underway replenishment operations. It will carry two cargo helicopters and armament similar to the Fast Combat Support Ship.

Ø Oceanographic Research Ship -- One to be built for \$4.9 million.

This ship is designed as a floating laboratory to be manned and operated by civilians for oceanographic research to be applied to naval warfare, particularly antisubmarine warfare. Facilities will permit study of the environmental effects of the ocean on scientific and naval instruments. It will also be used to obtain scientific information necessary for the installation and improvement of oceanic surveillance systems.

Ø Escort Research Ship -- One to be built for \$26 million.

An experimental hull of advanced hydrodynamic and propulsion design will be used for this ship, which is expected to provide data for determining the optimum configuration for mounting sonar devices. In addition to its submarine detection equipment the ship will have weight and space reserved for installation of various types of antisubmarine warfare armament which will give it a combat capability.

Ø Deep Diving Submarine -- One to be built for \$20.8 million.

This is a small vehicle for experimental development of hull structures, sonar equipments and weapons systems for combatant submarines of the future. Emphasis is on small size, greatly increased test depth, active and passive sonar and proper instrumentation for acoustic and oceanographic research. When not engaged in obtaining information for future submarine designs, it will serve as a medium-speed deep weapon impact target for antisubmarine warfare forces. It will be powered by a single screw, diesel-electric battery system and will have a 21-inch torpedo tube.

Ø Albacore Conversion -- Cost, \$14 million.

Various modifications of this experimental submarine are planned. Major emphasis will be on a contra-rotating motor driving two propellers counter-rotating about the same axis, and a high capacity silver-zinc storage battery. The new motor is expected to provide data on the results of eliminating noisy reduction gears for application to future nuclear submarines. Together with the new battery, this should provide much-needed data on high-speed cavitation-free propulsion.

Ø Amphibious Transport Dock -- One to be built for \$41.4 million.

This ship, third in a new series, carries both men and equipment and is designed to replace the attack transport and attack cargo ship. It will combat-load, transport and land about 900 troops and their equipment via six large transport helicopters, one large utility landing craft and three smaller landing craft -- any of which can be launched while the ship is underway or stopped.

Ø Destroyer Conversions -- Fourteen to be converted for \$142.1 million.

This is a continuation of the fleet rehabilitation and modernization (FRAM) program which includes overhaul, replacement of worn machinery components and hull repair. The latest surface and air search radars and electronic counter-measure equipment will be added and improvements will be made in the combat information center. Antisubmarine equipment will include a long-range sonar, an antisubmarine rocket launcher, two torpedo launchers and two drone antisubmarine (DASH) helicopters. The two forward 5"/38 caliber twin dual purpose batteries will be retained.

* NAVY SHIPBUILDING PROGRAM (Continued)

Here are assignments of construction and conversion of ships as released during the week:

NEW CONSTRUCTION

Mare Island Naval Shipyard.....1 nuclear-powered fleet ballistic missile submarine (SSBN)

Portsmouth Naval Shipyard.....1 nuclear-powered fleet ballistic missile submarine (SSBN)

1 auxiliary deep diving submarine

New York Naval Shipyard.....1 amphibious transport dock (LPD)

Puget Sound Naval Shipyard.....1 fast combat support ship (AOE)

CONVERSIONS

Portsmouth Naval Shipyard.....1 auxiliary submarine (AGSS) (ALBACORE)

Boston Naval Shipyard.....1 destroyer

New York Naval Shipyard.....4 destroyers

Philadelphia Naval Shipyard.....1 destroyer

Charleston Naval Shipyard.....2 destroyers

Puget Sound Naval Shipyard.....4 destroyers

Mare Island Naval Shipyard.....1 destroyer

San Francisco Naval Shipyard.....1 destroyer

Construction of the following ships in the Fiscal 1961 Program will be awarded on a competitive basis to "qualified private yards in such a manner as to insure reasonable cost and timely delivery":

1 attack aircraft carrier (CVA)

3 nuclear-powered fleet ballistic missile submarines (SSBN)

1 nuclear-powered attack submarine (SSN)

3 guided missile frigates (DLG)

2 guided missile destroyers (DDG)

2 escort vessels (DE)

1 oceanographic research ship (AGOR)

1 escort research ship (AG)

1 combat store ship (AFS)

2 large harbor tugs (YTB), and

20 landing craft, mechanized (LCM 6).

The conventionally-powered aircraft carrier (CVA) will have the basic hull form of a FORRESTAL-Class carrier. The ship will have an improved landing system, and will be armed with TERRIER missiles in twin launchers.

R E S E A R C H C H E C K L I S T

- () AUTOMATIC FLAW DETECTOR: Army Ordnance has developed an Automatic Flaw Detector for projectiles using the magnetic induction method. The detector is said to be capable of automatically inspecting high explosive shell bodies and armor-piercing shots from 75 to 120 mm.

(Report, discussing principles of operation and electromechanical and electronic circuits involved, now available. 16 Pages. 50 Cents.

(Write OTS, U. S. Department of Commerce, Washington 25, D. C. for PB 161 328 -- Magnetic Inspection of Projectiles by Induction Techniques)

- () PRINTED CIRCUIT SWITCH: Army Signal Corps researchers have developed a multiple pole, multiple circuit switch said to be readily adaptable wherever printed wiring boards are employed for mounting and interconnecting parts. It is believed that in kit form the switch is an excellent laboratory tool for experimental circuit design, and that, in its assembled form, it can be applied to production and assembled to the printed circuit by automatic parts placement machinery. In early studies, the switch proved capable of performing all switching functions in a commercial tube tester. Additional fields of application are said to include oscilloscopes, signal generators, multiband receivers, etc.

Report, detailing design and application as of August, 1958, now available. 27 Pages. \$1. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for PB 161 458 -- A Versatile Printed Circuit Switch for Application in the Laboratory and in Production)

- () CALCULATING FALLOUT: A method for calculating fallout gamma radiation intensities has been developed at the National Bureau of Standards. It is said to make possible simple calculations of intensities within basements and can also be used to find, at the center of a structure, the intensity of radiation entering through windows. The Bureau believes that with further refinement the method should provide an improved theoretical approach to the analysis of shielding properties of structures.

(For Details on Calculation of Fallout Gamma Radiation Within Structures write National Bureau of Standards, Office of Technical Information, Washington 25, D. C.)

- () AIRCRAFT BRAKING STUDIES: Researchers at the Langley, Va. Center of the National Aeronautics and Space Administration report "significant improvements" have been obtained with alternate experimental methods of improving braking friction of aircraft on wet surfaces. In one method a free-rolling or idling wheel is mounted ahead of a braking wheel to clear away water. In the other, an air jet is directed on the water-covered surface ahead of the braking wheel. Research is continuing on these and related techniques.

(Report Available. 20 Pages. Single Copies Free. Write National Aeronautics and Space Administration, Attn: CODE BID for NASA TN D-405)

P U B L I C A T I O N C H E C K L I S T

- () SPACE, MISSILES, AND THE NATION, an often critical report of U. S. progress or lack of progress in these fields. Based on Congressional testimony from the military, industry and private organizations. 61 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Bldg., Washington 25, D. C. for House Report No. 2092)

- () COMMERCIAL STANDARDS, a new index of voluntary standards adopted by industry to establish nationally recognized quality requirements, including methods of testing, rating or grading. Covers such fields as chemicals; electrical and mechanical equipment; paper and petroleum products; plastics; rubber products; precious metals, etc. Single Copies Free. (Write Commodity Standards Division, U. S. Department of Commerce, Washington 25, D. C. for Catalog No. 978 and Commodity Standards Pamphlet)

- () WEATHER MODIFICATION, a brief report on the weather modification program sponsored by the National Science Foundation and other government agencies. 16 Pages. 35 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. NSF 60-24)

- () CIVIL DEFENSE SHELTER POLICY, a critical report on present government-planning for fallout shelters and other aspects of civil defense. Includes a discussion of fallout implications in U. S. missile base locations. 48 Pages. Single Copies Free. (Write Committee on Government Operations, U. S. House of Representatives, Washington 25, D. C. for House Report No. 2069)

- () COMPOSITE MATERIALS AND STRUCTURES, a transcript of the August 1959 proceedings of the Army-sponsored Sagamore Ordnance Materials Research Conference, now publicly available. Covers such subjects as Strengthening of Composites; Metallic Composites; Glass Reinforced Plastics; Composite Pressure Vessels and Composite Systems for Thermal Protection. 549 Pages. \$7. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for PB 161 443)

- () SYNCHROS, a 1958 Defense Department handbook emphasizing military synchros but containing much data applicable to equivalent commercial devices. 104 Pages. 70 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. D 215.9:1303)

- () JET PROPULSION POWER PLANTS, a new Air Force manual presenting the history, development and theory of operation of five current types of jet propulsion power plants. Suggested as a reference or refresher for experienced jet engine personnel and as an introduction for anyone desiring to train in this field. 108 Pages. \$1.50. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Pub. D301.7:52-5)

- () AVIATION CARTOGRAPHY, a new edition of a standard reference work containing a bibliography of the literature on this subject and a study of the historical development of aviation charts. 245 Pages. \$1.75. (Write Card Division, Library of Congress, Washington 25, D. C. for Aviation Cartography)

- () U. S. GOVERNMENT ORGANIZATION MANUAL, a standard reference work. The 1960-1961 edition lists the names of more than 4200 officials in civilian and military positions and includes much additional information on Government organization. 817 Pages. \$1.50. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

